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ABSTRACT

This paper redefines and clarifies the standpoints of environmental attitudes (EA), knowledge scales (EK), and affiliated studies. Considering the quality of environmental education studies, this paper tries to give a sharp and concrete message to environmental science educators and researchers and strengthen the paths of environmental education studies. Four main problems throughout the research process are discussed: (1) inconsistency of environmental characteristics; (2) theoretical framework and interpretations; (3) development of attitude and knowledge scales; and (4) research methodology. (Author/KHR)

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# The Ignored Facets of Environmental Attitude and Knowledge Scales

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## Introduction

The purpose of the present article is to redefine and clarify the standpoints of environmental attitude (EA), knowledge scales (EK), and affiliated studies.

One of the most recent and important criticisms was written by Zelezny (1999) and appeared in the Journal of Environmental Education. As she pointed out, the quality of environmental education studies are sometimes debatable. Considering mentioned criticism, this paper will try to give a sharp and concrete message to both environmental (science) educators and researchers and strengthen the paths of environmental education studies. Thus, first, we need to talk about the problems that we have encountered throughout a research process. These are as follow:

I. Inconsistency of environmental characteristics (Arcury & Christianson, 1993)
II. Theoretical framework and interpretations (Kim, 1999; Abramson & Inglehart, 1995)
III. Development of attitude and knowledge scales (Nickerson, 2003)

The state -of -the- art environmental education encompasses compatibility such as:

a. The relationship between NSES and the development of attitude and knowledge scales
b. The relationship between critical thinking and development of attitude and knowledge scales
c. The relationship between nature of science and development of attitude and knowledge scales

IV. Research methodology (Hungerford, 1980; Schwandt, 1994)

**Inconsistency of Environmental Characteristics**

There is not a consistent variable that we know to explain and interpret the foundation of environmental attitudes (Arcury & Christianson, 1993). The factors that can affect the EA of people, as well as students, can vary depending on many different issues. For instance, according to Easterlin and Crimmins(1991), personal expectation is one the more influential determinants for EA. Likewise, Krugman (1992) stresses that the income gap between the poor and the rich people is another factor that shapes the EA of people. Similarly, high school students in Australia believe that "money will always win out over the environment" (Connell et al., 1999). Outcome is an interesting issue because even though Australia is not one of the third world countries that suffer with financial problems, the new generation is mostly pessimistic about the solution of environmental problems. Aforementioned perspective that was also articulated by high school students in Australia could be easily found in Gigliotti's (1993) research that was conducted in the U.S.

Other researchers such as Mohai and Bryant (1998), Kim (1999), Uyeki and Holland (2000), also used different independent variables to elucidate the factors that are influential. According to Mohai and Bryant (1998), social status of people is one of them. According to their research results, there is no statistically significant race effect on environmental awareness regarding global environmental problems. Contrary to popular belief, this research result shows that African-Americans are more concerned about their neighborhoods' problems than Whites are. Uyeki and Holland (2000) used similar variables such as age, income, race, and gender to determine what factors can affect pro-environmental, pro-animal, and less-growth attitudes of the people. The findings show

that people with lower incomes and less education are more pro-environment and pro-animal. Kim (1999) revealed another dimension of EAs that is related to traditional values of nations. Other researchers stress the importance of particular geographic regions on EAs of people (Rohrschneider, 1988; Blake, 2001).

As stated above, different variables have been used to explore environmental attitudes of the people. Although these studies have helped to enlighten the relationships between different variables and environmental attitudes, there have not been concrete explanatory variables that could uncover the whole or part of the puzzle because of the complexity of human behavior. Optimistically, some theories, which will be mentioned in this paper later on, such as Postmaterialist Approach (Abramson & Inglehart, 1995) and the New Environmental Paradigm (Dunlap & Van Liere, 1978) have given the researchers an opportunity to draw a concrete framework about environmental attitudes and its foundation for almost 25 years.

**Theoretical Framework and Interpretation**

One of the most important supportive elements of social studies is the unbiased interpretation depending on concrete theoretical framework. Unfortunately, a logically acceptable theoretical framework for EA of people, with some exceptions, such as Abramson's and Inglehart's (1995) and Dunlap and Van Liere (1978) has not been produced yet. Although many environmental attitude and knowledge scales have been developed over years, most of them have not had any definitions about the theoretical background of survey questions. Thus, the relationship between environmental attitudes and its foundation have not been comprehended yet. One of these articles, written by Arcury and Christianson (1993), mentions the inconsistent characteristics of environmental attitudes. Although this criticism is partly correct in explaining actual situations, it does little to help environmental education researchers. In the cases that it is true, what are we supposed to do to explore the origins of EA and interpret the data without bias?

According to Holsman (2001), without political action, environmental education programs will always be at risk. From this point of view, the quality of environmental education affiliated studies should be supported with strong theories that might be ideologically oriented. Many studies have emphasized the relationship between ideology and environmental attitude (Dunlap, 1975). Every researcher should disclose what kind of approach she or he has pursued throughout the study e.g. ecocentric or technocentric (O' Riordan, 1988), and should label the presented instrument, so that the credibility of the research will be accepted without criticism; or, at least, a researcher will have a chance to reduce the criticism about his/her research quality.

**Development of Attitude and Knowledge Scale**

Obviously, developing a new scale has challenging steps. We should consider many issues throughout the process. According to Schindler (1999), demographic characteristics of survey are one of the vital fibers of the scale's supportive and evaluative elements. In addition to this, age appropriateness, psychometric principles, and understandable items on the survey are other components of the scale that support the validity of research (Musser & Malkus, 1994). The validity of the instrument can be defined in different ways such as traditional or Unitarian (Messick, 1989; Thorndike et. al, 1991). Even if we do not have a common agreement surrounding this concept, some terms such as appropriateness, meaningfulness, and usefulness are still the

basic supportive elements that help us to measure what we really would like to measure (Messick, 1989). Although validity is quite flexible and an easily manipulated term, it does not mean that it is just related to the instrument rather than whole research process. As Leeming and Dwyer (1995) stated, "meaningful comparison among investigations in this area [environmental attitude] are difficult" because most of the researchers have ignored psychometric properties. Even if this is one of the most important issues regarding the developing and validation of the new scales, beyond that many other issues should be considered before beginning and throughout the research.

First, how do we support content validity of environmental attitude and knowledge scale? According to some researchers (Yilmaz, et. al, 2002; Leeming et.al, 1995), the professionals can certify content validity of the survey, which is commonly accepted in academia. But who the professional is and who will decide the content validity; those are not coherent issues.

Secondly, the questions on the survey should be chosen very carefully both linguistically and conceptually. As stated by Hungerford and his coworkers (1980), curriculum development constitutes "a valid, syntactically sound, suitable framework for use in guiding development in environmental education". This is also a valid perspective to develop an instrument. Again, not all, but many researchers believe that as long as the curriculum includes some environmental topics (Yilmaz, et al, 2002), such topics can be placed on the test instrument as a question which is very debatable. And considering the centralized- curriculum in some countries, curriculum developing process and whose values and knowledge have been based on this curriculum, all these mentioned subjects create controversial issues for throughout the study.

Thirdly, we are supposed to clarify with what environmental education will provide the students and why we need environmental education desperately in the 21st century. According to Vande Visse and Stapp (1975), "...without a clear statement of goals, an environmental education program would become a series of unrelated experiences, focusing on limited program objectives". From this point of view, environmental education has different dimensions that match with the contemporary willingness and perspectives of science education. Then, we should find out and self-criticize how the – state- of -the art education have matched or not matched with completed studies for years. To the National Science Education Standards, authentic problems, creative and critical thinking, problem- solving, collaborative working, and professional development are some of the most vital components of the 21st century's science education which I believe they are almost accepted by science educators with common agreement. Although it sounds like collaboration of science education standards and the goals of environmental education work together perfectly, this is not the case for environmental studies (Zelezny, 1999). It is difficult to say that all questions which have been considered as items on measurement instrument on the tests match with the nature of science or the practical purposes of science education that have been stressed over and over again in many books (AAAS, 1989; NRC, 1996; NRC, 2000).

If some accepted goals of science education are to motivate students to think critically without bias and rote memorization and help them conceive the nature of science, we are supposed to develop scales and conduct studies on these purposes. Unfortunately, some of the tests that were published have not worked on these purposes. For example, some questions from environmental knowledge survey, used by Leeming

and Dwyer (1995), are following with reasons why they are not appropriate in this instrument.

(Pollution) Item 8) " The most common poisons found in water are:
a) arsenic, silver nitrates b) hydrocarbons c) carbon monoxide d) sulfur, calcium e) nitrates, phosphates

(General) Item 3) Ecology assumes that man is what part of nature?
a) special b) related to all other parts c) not important d) the best part e) the first part

(General) Item 13) Which of the following is the most dangerous to the earth's environment?
a) damming rivers b) overpopulation c) tornadoes d) household pets e) nuclear power plants

(General) Item 30) Which of the following groups is the most interested in environmental issues?
a) Boy Scouts of America b) The Sierra c) Kiwanis d) 4-H Club e) American Cancer Society

Some criticisms about these questions are as follow:

1) The *content* of questions and correct answers are debatable. Which is the most dangerous? The most interested? All these questions depend on researcher's perspective and subjectivity. At least, researchers could have given the name of the person who designed these questions so that the questions could not be perceived as "biased questions" (Rasinski, 1989). The questions do not fit the *nature of science* that support critical thinking. Many of the questions are based on rote memorization not the National Science Education Standards.
2) There is not a *theoretical framework* both *for the survey* and *an intervention* (O'Riordan, 1988). What kind of approach researchers got involved in before beginning the study is not clear. There is not a concrete framework to interpret the data. Thus it is hard to say that the data could be interpreted easily.
3) If the questions are categorized under the *general environmental knowledge* title, where is the Greenpeace International in the NGOs? Are these organizations the best known after intervention?
4) The definition of ecology is not commonly accepted. It changes from person to person and there is no place to put the ecology as a term in a strictly framed *inquiry-based science education*. There is not a clear definition for the term ecology and the approaches that the survey is based on (O' Sullivan, 1991).

Finally, "environmental knowledge was defined as a student's ability to understand and evaluate the impact of society on the ecosystem" (Gambro & Switzky, 1996). Unfortunately, the categorization of these questions under this definition is quite difficult.

Some questions from another instrument which basically aimed to develop a new attitude scale for $4^{th}$-$8^{th}$ grade students in Turkey and its criticism (Yilmaz et.al, 2002) can be found below.

Item1) Pesticide and herbicide use should be increased to increase food production (The aim of biocide use has not been understood by undergrad students whose majors are agriculture. This does not mean we, as a researcher, have a right to put all questions in our survey neglecting the age appropriateness. This does not mean that as long as curriculum mentions about these topics so that we can refer to these topics).

Item2) Economic growth is more important than environmental protection (Considering, still "economic growth", "sustainable development", and "sustainable growth" are the terms which are not clearly defined and worldwide accepted by the authorities (Palmer, 1998), how students between $4^{th}$ –$8^{th}$ grades will conceive the term "economical growth", it is not certain).

Item3) People should be free to use their lands as they please.
("Free use of people's own land" cannot be analyzed easily without any theoretical framework. For instance, Dominant Social Paradigm (DSP) could have been used as a theoretical framework by the researchers to interpret the results (Pirages, 1977)).

Consequently, if all these questions just have been asked without any specific worldview, ignoring the NSES and the foundation of environmental attitudes, it is difficult to say that this and similar studies will help science educators accumulate usable, practical, and accountable knowledge about these matters.

**Research Methodology**

Although research methodology is another controversial issue in this area, there is no need polar and tension between the qualitative and the quantitative studies as long as aforementioned issues are taken in account.

**Conclusion**

To sum up, we need to answer *why questions* throughout the research project. We should have somehow accepted steps and rules beyond the basic psychometric principles. Considering the quality of EA and EK scales and affiliated all studies;

- We should comprehend different dimensions of EA such as socioeconomic status of participants, neighborhood, ethnicity, traditions etc.
- We should explain and find answers for all why questions which we should do to reach out the foundation of EA of the students. Our duty is not just develop a scale it is beyond that as a researcher.
- We should not put all questions in our instrument for the sake of developing a new instrument. If we are always talking about over and over again the value of critical thinking in graduate courses, we should reflect this perspective to our researches.
- We should use logical, world widely accepted theories, which might be ideologically oriented to interpret data.
- We should have enough environmental science knowledge to put proper questions on the scale beyond reliability and validity.
- We should not force ourselves to be polarized regarding research methodology. Absolutely both qualitative and quantitative studies can work together.

Finally, both the basic goals of science education and the practical purposes of environmental education should be in harmony so that we can do more for our common future.

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